

## SEQUENCE LISTING

SEQ ID NO: 1: Nucleotide sequence of 11.5 kb PCR product amplified from chromosomal DNA of *C. jejuni* OH4384 which includes *LOS* biosynthesis locus

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1 aaagaatacg aatttgctaa agaggtttta aatcttagtg gtattgatga aacacatata
61 gaattagcgc caaaatttaa tcttgaagag ctaatggcctt ttacaaaaat gatggatcctt
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361 tgatagaata tatcttagtc tttattatat tttgaaattt tttgttactt ttatgcctga
421 ttgtatcttg catttttttag ctttgattgt agcaagaatc gcttttcac ttaacaaaaa
481 acaccgcaa atcatcaata caaatttgca aatctgtttt cctcaatata ctcaaaaaaga
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601 gcaaatcaa aacaccacca aagaaaaat tctcaataaa gtaaatttca tcaatgaaaa
661 ttttcttata gatgccctgg ctttaaagcg tctattatc ttcacaaactg cacactatgg
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781 aaaaagtta aaagtgaag ttatgtatga aattttaagc caaagtcgca ccaatttga
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1081 taaagcaaaa gattctcaaa atgcaagttt agaagaactg acactttatc aagcacaaa
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1441 ttaaaaaaac ttgctttaag ttatgcaaaa aatgattgga ttttaagcat tgatgctgat
1501 gaagtgcctg aaatgagtg tattaaagag cttaaaaatt taaaacttca agaagataat
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SEQ ID NO: 1 (cont'd)

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 2521 aggtattagg ggttgcaata tgagtttttt taaaactgat ttgatgaac ttgatgggtt  
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3541 tagtgctaataaaaatttatgtttttatcaca aaagttgtgtat ttgtgtcgtt taagagcaaa  
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 7561 cagataatct tgcgtgttta ggtgcggttg cacttggtgc ttgtgtgctt gaaagacatt  
 7621 ttactgatag tatgcataga agtggccctg atatagtttg ttctatggat acacaggctt  
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 11101 aaaaacatta taaatcaga actagaatgc aaaccccca aatttctact tgcaaaagtg  
 11161 cctaaaattt cttcattttg aaagattttt attcttggat ctttttttgc aaattcttaa

SEQ ID NO: 1 (cont'd)

11221 accatattta aactattatc ttacttttta tcatcgataa tcaaaatttc aatatctttt  
11281 aaagtctgat ttatacaact ttgcaaaagct cttgagataa aatcgcaaga attaaaaagc  
11341 gggattatga tagaaaagttg tggcatattt ttcctaaatt ttgttaaaat aataaaaaaca  
11401 attctatcaa agtttaggaa atttatgaaa atttttatc accttccaaç ctggttaggc  
11461 gatacgggtaa tggc

SEQ ID NO: 2: Nucleotide sequence that encodes bifunctional sialyltransferase *cstII* from *C. jejuni* strain OH4384 (ORF 7a of *LOS* biosynthesis locus)

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
TTATTCAAGA	CTACCAAATG	ATTTTGATGT	ATTTAGATGT	AATCAATTTT	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATGCAAGGC	AGTATTTTAC	150
AATCCTATTC	TTTTTTTTGA	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATTAT	GTGTTCTAAT	TACAACCAAG	250
CTCATCTAGA	AAATGAAAAT	TTTGTAAGAA	CTTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTCAA	CAACTTAAAG	ATTTTAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATTTCAA	TCAAAGAATT	ACCTCAGGGG	400
TTTATATGTG	TGCAGTAGCC	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCGGGAATTG	ATTTTTATCA	AAATGGGTCA	TCTTATGCTT	TTGATACTAA	500
ACAAAAAAT	CTTTTAAAAT	TGGCTCCTAA	TTTTTAAAAT	GATAATTCAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	TAAAAGCTTT	AGAATTTCTA	600
GAAAAAACTT	ACAAAATAAA	ACTATATTGC	TTATGTCCTA	ACAGTCTTTT	650
AGCAAAATTT	ATAGAAGTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAACTACACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750
TATGGAAAAAT	TTTCAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATT	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 3: Amino acid sequence of bifunctional sialyltransferase *CstII* from *C. jejuni* strain OH4384 (encoded by ORF 7a of *LOS* biosynthesis locus)

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	C NQFYFEDKYY	LGKKCKAVFY
51	NPILFFEQYY	TLKHLIQNQE	YETELIMCSN	YNQAHLENEN	FVKTFYDYFP
101	DAHLGYDFFK	QLKDFNAYFK	FHEIYFNQRI	TSGVYMCABA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQKN	LLKLAPNFKN	DNSHYIGHSK	NTDIKALEFL
201	EKTYKIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFSKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 4: Nucleotide sequence of bifunctional sialyltransferase-encoding *cstII* (ORF7a) from *LOS* biosynthesis locus of *C. jejuni* serotype O:10

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
TTATTCAAGG	CTACCAAATG	ATTTTGATGT	ATTTAGATGC	AATCAATTTT	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATTCAAAGC	AGTATTTTAC	150
AATCCTGGTC	TTTTTTTTGA	ACAATACTAC	ACTTTAAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATTAT	GTGTTCTAAT	TACAACCAAG	250
CTCATCTAGA	AAATGAAAAT	TTTGTAAGAA	CTTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTAAA	CAACTTAAAG	AATTTAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATCTCAA	TCAAAGAATT	ACCTCAGGAG	400
TCTATATGTG	TGCAGTAGCT	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCTGGAATTG	ATTTTTATCA	AAATGGGTCA	TCTTATGCTT	TTGATACCAA	500
ACAAGAAAAAT	CTTTTAAAAC	TGGCTCCTGA	TTTTTAAAAT	GATCGCTCAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	TAAAAGCTTT	AGAATTTCTA	600
GAAAAAACTT	ACAAAATAAA	ACTATATTGC	TTATGTCCTA	ACAGTCTTTT	650
AGCAAAATTT	ATAGAAGTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAACTACACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750



TATGGAAAAT	TTTCAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATTA	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 5. Amino acid sequence of bifunctional sialyltransferase *cstII* encoded by ORF 7a of *LOS* biosynthesis locus from *C. jejuni* serotype O:10

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	C	NQFYFEDKYY LGKKFKAVFY
51	NPGLFFEQYY	TLKHLIQNQE	YETELIMCSN	YNQAHLENEN	FVKTFYDYFP
101	DAHLGYDFFK	QLKEFNAYFK	FHEIYLNQRI	TSGVYMCVA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQEN	LLKLAPDFKN	DRSHYIGHSK	NTDIKALEFL
201	EKTYKIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFSKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 6. Nucleotide sequence of *C. jejuni* serotype O:41 *cstII* coding region

ATGAAAAAAG	TTATTATTGC	TGGAAATGGA	CCAAGTTTAA	AAGAAATTGA	50
TTATTCAAGA	CTACCAAATG	ATTTTGATGT	ATTTAGATGC	AATCAATTTT	100
ATTTTGAAGA	TAAATACTAT	CTTGGTAAAA	AATGCAAAGC	AGTATTTTAC	150
AATCCTAGTC	TTTTTTTGA	ACAATACTAC	ACTTTAAAC	ATTTAATCCA	200
AAATCAAGAA	TATGAGACCG	AACTAATCAT	GTGTTCTAAT	TTTAACCAAG	250
CTCATCTAGA	AAATCAAAAT	TTTGTAACAA	CTTTTACGA	TTATTTTCCT	300
GATGCTCATT	TGGGATATGA	TTTTTTTCAA	CAACTTAAAG	AATTCAATGC	350
TTATTTTAAA	TTTCACGAAA	TTTATTTCAA	TCAAAGAATT	ACCTCAGGGG	400
TCTATATGTG	CACAGTAGCC	ATAGCCCTAG	GATACAAAGA	AATTTATCTT	450
TCGGGAATTG	ATTTTATCA	AAATGGATCA	TCTTATGCTT	TTGATACCAA	500
ACAAAAAAT	CTTTTAAAT	TGGCTCCTAA	TTTTTAAAT	GATAATTCAC	550
ACTATATCGG	ACATAGTAAA	AATACAGATA	TAAAAGCTTT	AGAATTTCTA	600
GAAAAAACTT	ACGAAATAAA	GCTATATTGT	TTATGTCCTA	ACAGTCTTTT	650
AGCAAATTTT	ATAGAACTAG	CGCCAAATTT	AAATTCAAAT	TTTATCATAC	700
AAGAAAAAAA	TAACTATACT	AAAGATATAC	TCATACCTTC	TAGTGAGGCT	750
TATGGAAAAT	TTACAAAAAA	TATTAATTTT	AAAAAAATAA	AAATTAAAGA	800
AAATATTTAT	TACAAGTTGA	TAAAAGATCT	ATTAAGATTA	CCTAGTGATA	850
TAAAGCATTA	TTTCAAAGGA	AAATAA			876

SEQ ID NO: 7. Amino acid sequence of *CstII* from *C. jejuni* serotype O:41

	10	20	30	40	50
1	MKKVIIAGNG	PSLKEIDYSR	LPNDFDVFR	C	NQFYFEDKYY LGKKCKAVFY
51	NPSLFFEQYY	TLKHLIQNQE	YETELIMCSN	FNQAHLENQN	FVKTFYDYFP
101	DAHLGYDFFK	QLKEFNAYFK	FHEIYFNQRI	TSGVYMCTVA	IALGYKEIYL
151	SGIDFYQNGS	SYAFDTKQKN	LLKLAPNFKN	DNSHYIGHSK	NTDIKALEFL
201	EKTYEIKLYC	LCPNSLLANF	IELAPNLNSN	FIIQEKNNYT	KDILIPSSEA
251	YGKFTKNINF	KKIKIKENIY	YKLIKDLLRL	PSDIKHYFKG	K

SEQ ID NO: 8. Nucleotide sequence of coding region for *CstII* from *C. jejuni* O:19.

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1  atgaaaaaag ttattattgc tggaaatgga ccaagtttaa aagaaattga
51  ttattcaagg ctaccaaatg attttgatgt atttagatgt aatcaatttt
101 attttgaaga taaatactat cttggtaaaa aatgcaaagc agtgttttac
151 acccctaatt tcttctttga gcaatactac actttaaaac atttaatcca
201 aaatcaagaa tatgagaccg aactaattat gtgttcta atacaaccaag
251 ctcattctaga aaatgaaaat tttgtaaaaa ctttttaacga ttattttcct
301 gatgctcatt tgggatatga ttttttttaa caacttaaag aatttaaatgc
351 ttatttttaa tttcacgaaa tttatttcaa tcaaagaatt acctcagggg
401 tctatatgtg tgcagtagcc atagccctag gatacaaaga aatttatctt
451 tcgggaattg atttttatca aaatgggtca tcttatgctt ttgataccaa
501 acaagaaaat ctttttaaac tagcccctga ttttaaaaat gatcgctcgc
551 actatatcgg acatagtaaa aatacagata taaaagcttt agaattttcta
601 gaaaaaactt acaaaaataaa actatattgc ttatgtccta atagtctttt
651 agcaaatttt atagaactag cgccaaattt aaattcaaat tttatcatac
701 aagaaaaaaa taactacact aaagatatac tcataccttc tagtgaggct
751 tatggaaaat tttcaaaaaa tattaatttt aaaaaataa aaattaaaga
801 aaatgtttat tacaagttga taaaagatct attaagatta cctagtata
851 taaagcatta tttcaaagga aaataa

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SEQ ID NO: 9: Amino acid sequence of *CstII* from *C. jejuni* O:19.

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1  MKKVIIAGNG PSLKEIDYSR LPNDFDVFR C NQFYFEDKYY LGKKCKAVFY
51  TPNFFFEQYY TLKHLIQNQE YETELIMCSN YNQAHLNEN FVKTFYDYFP
101 DAHLGYDFFK QLKEFNAYFK FHEIYFNQRI TSGVYMCABA IALGYKEIYL
151 SGIDFYQNGS SYAFDTKQEN LLKLAPDFKN DRSHYIGHSK NTDIKALEFL
201 EKTYKIKLYC LCPNSLLANF IELAPNLNSN FIIQEKNNYT KDILIPSSEA
251 YGKFSKNINF KKIKIKENVY YKLIKDLLRL PSDIKHYFKG K

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SEQ ID NO: 10. Amino acid sequence of *CstII* from *C. jejuni* strain NCTC 11168

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          10          20          30          40          50
1  MSMNINALVC GNGPSLKNID YKRLPKQFDV FRCNQFYFED RYFVGKDVKY
51  VFFNPFFVFFE QYYTSKKLIQ NEEYNIENIV CSTINLEYID GFQFVDNFEL
101 YFSDAFLGHE IIKKLKDFFA YIKYNEIYNR QRITSGVYMC ATAVALGYKS
151 IYISGIDFYQ DTNNLYAFDN NKKNLLNKCT GFKNQKFKFI NHSMACDLQA
201 LDYLMKRYDV NIYSLNSDEY FKLAPDIGSD FVLSKKPKKY INDILIPDKY
251 AQERYYGKKS RLKENLHYKL IKDLIRLPSD IKHYLKEKYA NKNR

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SEQ. ID NO: 11. Nucleotide sequence for coding region for *Cst III* from *C. jejuni* O:4

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1  ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA TTATTCAAGG
61  CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT ATTTTGAAGA TAAATACTAT
121 CTTGGTAAAA AATGCAAAGC AGTGTTTTAC ACCCCTGGTT TCTTCTTTGA GCAATACTAC
181 ACTTTAAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT
241 TACAACCAAG CTCATCTAGA AAATGAAAAT TTTGTAAAAA CTTTTTACGA TTATTTTCCT
301 GATGCTCATT TGGGATATGA TTTTTTAA CAACTTAAAG AATTTAATGC TTATTTTAAA
361 TTTACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC
421 ATAGCCCTAG GATACAAAGA AATTATCTT TCGGGAATTG ATTTTATCA AAATGGGTCA
481 TCTTATGCTT TTGATACCAA ACAAGAAAAT CTTTAAAAAC TAGCCCTGA TTTTAAAAAT
541 GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTCTA

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601 GAAAAAACTT ACAAATAAA ACTATATTGC TTATGTCCTA ACAGTCTTTT AGCAAATTTT  
 661 ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC AAGAAAAAAA TAACTACACT  
 721 AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTTT  
 781 AAAAAAATAA AAATTAAAGA AAATGTTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA  
 841 CCTAGTGATA TAAAGCATT TTTCAAAGGA AAA

SEQ ID NO: 12. Amino acid sequence of Cst II from *C. jejuni* 0:4

MKKVIIAGNG PSLKEIDYSR LPNDFDVFR C NQFYFEDKYY LGKKCKAVFY TPGFFFEQY  
 YTLKHLIQNQ EYETELIMCS NYNQAHLNE NFVKTFYDYF PDAHLGYDFF KQLKEFNAY  
 FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD  
 FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK  
 NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVVYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 13. Nucleotide sequence for coding region for Cst II from *C. jejuni* 0:36

ATGAAAAAAG TTATTATTGC TGGAAATGGA CCAAGTTTAA AAGAAATTGA TTATCAAGG  
 CTACCAAATG ATTTTGATGT ATTTAGATGT AATCAATTTT ATTTTGAAGA TAAATACTAT  
 CTTGGTAAAA AATGCAAAAC AGTGTTTTAC ACCCCTAATT TCTTCTTTGA GCAATACTAC  
 ACTTTAAAC ATTTAATCCA AAATCAAGAA TATGAGACCG AACTAATTAT GTGTTCTAAT  
 TACAACCAAG CTCATCTAGA AAATGAAAAA TTTGTAAAAA CTTTTTACGA TTATTTTCCT  
 GATGCTCATT TGGGATATGA TTTTTTTAAA CAACCTAAAG AATTTAATGC TTATTTTAAA  
 TTTCACGAAA TTTATTTCAA TCAAAGAATT ACCTCAGGGG TCTATATGTG TGCAGTAGCC  
 ATAGCCCTAG GATACAAAGA AATTTATCTT TCGGGAATTG ATTTTTATCA AAATGGGTCA  
 TCTTATGCTT TTGATACCAA ACAAGAAAAT CTTTTAAAC TAGCCCCTGA TTTTAAAAAT  
 GATCGCTCAC ACTATATCGG ACATAGTAAA AATACAGATA TAAAAGCTTT AGAATTCTA  
 GAAAAAACTT ACAAATAAA ACTATATTGC TTATGTCCTA ATAGTCTTTT AGCAAATTTT  
 ATAGAACTAG CGCCAAATTT AAATTCAAAT TTTATCATAC AAGAAAAAAA TAACTACACT  
 AAAGATATAC TCATACCTTC TAGTGAGGCT TATGGAAAAT TTTCAAAAAA TATTAATTTT  
 AAAAAAATAA AAATTAAAGA AAATGTTTAT TACAAGTTGA TAAAAGATCT ATTAAGATTA  
 CCTAGTGATA TAAAGCATT TTTCAAAGGA AAA

SEQ ID NO: 14. Amino acid sequence of Cst II from *C. jejuni* 0:36.

MKKVIIAGNG PSLKEIDYSR LPNDFDVFR C NQFYFEDKYY LGKKCKTVFY TPNFFFEQY  
 YTLKHLIQNQ EYETELIMCS NYNQAHLNE NFVKTFYDYF PDAHLGYDFF KQLKEFNAY  
 FKFHEIYFNQ RITSGVYMCA VAIALGYKEI YLSGIDFYQN GSSYAFDTKQ ENLLKLAPD  
 FKNDRSHYIG HSKNTDIKAL EFLEKTYKIK LYCLCPNSLL ANFIELAPNL NSNFIIQEK  
 NNYTKDILIP SSEAYGKFSK NINFKKIKIK ENVVYKLIKD LLRLPSDIKH YFKGK

SEQ ID NO: 15: Nucleotide sequence of glycosyltransferase-encoding ORF 4a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGAAGAAAA	TAGGTGTAGT	TATACCAATC	TATAATGTAG	AAAAATATTT	50
AAGAGAATGT	TTAGATAGCG	TTATCAATCA	AACTTATACT	AACTTAGAAA	100
TCATACTTGT	CAATGATGGT	AGCACAGATG	AACACTCACT	CAATATTGCA	150
AAAGAAATATA	CCTTAAAAGA	TAAAAGAATA	ACTCTTTTTG	ATAAGAAAAA	200
TGGGGGTTTA	AGTTCAGCTA	GAAATATAGG	TATAGAATAC	TTTAGCGGGG	250
AATATAAATT	AAAAAACAAA	ACTCAACATA	TAAAAGAAAA	TTCTTTAATA	300
GAATTTCAAT	TGGATGGTAA	TAATCCTTAT	AATATATATA	AAGCATATAA	350
AAGCTCTCAA	GCTTTTAATA	ATGAAAAAGA	TTTAACCAAT	TTTACTTACC	400
CTAGTATAGA	TTATATTATA	TTCTTAGATA	GTGATAATTA	TTGGAAACTA	450
AACTGCATAG	AAGAATGCGT	TATAAGAATG	AAAAATGTGG	ATGTATTGTG	500
GTTTGACCAT	GATTGCACCT	ATGAAGACAA	TATAAAAAAT	AAGCACAAAA	550
AAACAAGGAT	GGAAATTTTT	GATTTTAAAA	AAGAATGTAT	AATCACTCCA	600

AAAGAATATG	CAAATCGAGC	ATTAAGTGTA	GGATCTAGAG	ATATTTCTTT	650
TGGATGGAAT	GGAATGATTG	ATTTTAATTT	TTTAAAGCAA	ATTAAACTTA	700
AATTTATAAA	TTTTATTATC	AATGAAGATA	TACACTTTGG	GATAATTTTG	750
TTTGCTAGTG	CTAATAAAAT	TTATGTTTTA	TCACAAAAGT	TGTATTTGTG	800
TCGTTTAAGA	GCAAACAGTA	TATCAAATCA	TGATAAGAAG	ATTACAAAAG	850
CAAATGTGTC	AGAGTATTTT	AAAGATATAT	ATGAAACTTT	CGGGGAAAAC	900
GCTAAGGAAG	CAAAAAATTA	TTTAAAAGCA	GCAAGCAGGG	TTATAACTGC	950
TTTAAAATTG	ATAGAATTTT	TTAAAGATCA	AAAAAACGAA	AATGCACTTG	1000
CTATAAAAGA	AACATTTTTA	CCTTGCTATG	CCAAAAAAGC	TTTAATGATT	1050
AAAAAATTTA	AAAAAGATCC	TTTAAATTTA	AAGGAACAAT	TAGTTTTAAT	1100
TAAACCTTTT	ATTCAAACAA	AACTTCCTTA	TGATATTGG	AAATTTTGGC	1150
AAAAAATAAA	AAATATTTAA				1170

SEQ ID NO: 16: Nucleotide sequence of  $\beta$ 1,4 GalNAc transferase-encoding ORF 5a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

ATGCTATTTT	AATCATACTT	TGTGAAAATA	ATTTGCTTAT	TCATCCCTTT	50
TAGAAAAATT	AGACATAAAA	TAAAAAAAAC	ATTTTTACTA	AAAAACATAC	100
AACGAGATAA	AATCGATTCT	TATTTACCAA	AAAAAACTCT	TGTGCAAATT	150
AATAAATACA	ACAATGAAGA	TTTAATTAAA	CTTAATAAAG	CTATTATAGG	200
GGAGGGGCAT	AAAGGATATT	TTAATTATGA	TGAAAAATCT	AAAGATCCAA	250
AATCTCCTTT	GAATCCTTGG	GCTTTTATAC	GAGTAAAAAA	TGAAGCTATT	300
ACCTTAAAAG	CTTCTCTTGA	AAGCATATTG	CCTGCTATCC	AAAGAGGTGT	350
TATAGGATAT	AATGATTGTA	CCGATGGAAG	TGAAGAAATA	ATTCTAGAAT	400
TTTGCAAACA	ATATCCTTCA	TTTATACCAA	TAAAATATCC	TTATGAAATT	450
CAAATTCAAA	ACCCAAAATC	AGAAGAAAAT	AACTCTATA	GCTATTATAA	500
TTATGTTGCA	AGTTTTATAC	CAAAAGATGA	GTGGCTTATA	AAAATAGATG	550
TGGATCATAT	CTATGATGCT	AAAAAACTTT	ATAAAAGCTT	CTATATACCA	600
AAAAACAAAT	ATGATGTAGT	TAGTTATTCA	AGGGTTGATA	TTCACTATT	650
TAATGATAAT	TTTTTTCTTT	GTAAAGATAA	TAATGGCAAT	ATATTGAAAG	700
AACCAGGAGA	TTGCTTGCTT	ATCAATAATT	ATACTTAAA	ATGGAAAGAA	750
GTATTAATTG	ACAGAATCAA	TAACAATTGG	AAAAAAGCAA	CAAAACAAAG	800
TTTTTCTTCA	AATATACACT	CTTTAGAGCA	ATTAAAGTAT	AAACACAGGA	850
TATTATTTCA	CACTGAATTA	AATAATTATC	ATTTTCCTTT	TTTAAAAAAA	900
CATAGAGCTC	AAGATATTTA	TAAATATAAT	TGGATAAGTA	TTGAAGAATT	950
TAAAAAATTC	TATTTACAAA	ATATTAATCA	TAAAATAGAA	CCTTCTATGA	1000
TTTCAAAAGA	AACTCTAAAA	AAAATATTCT	TAACATTGTT	TTAA	1044

SEQ ID NO: 17: Amino acid sequence of  $\beta$ 1,4 GalNAc transferase from *C. jejuni* strain OH4384 (encoded by ORF 5a of *LOS* biosynthesis locus)

	10	20	30	40	50
1	MLFQSYFVKI	ICLFIPFRKI	RHKIKKTFL	KNIQRDKIDS	YLPKKTTLVQI
51	NKYNNEDELIK	LNKAIIGEGH	KGYFNYDEKS	KDPKSPLNPW	AFIRVKNEAI
101	TLKASLESIL	PAIQRGVIGY	NDCTDGSEEI	ILEFCKQYPS	FIPIKYPYEI
151	QIQNPKESEN	KLYSYNYVA	SFIPKDEWLI	KIDVDHIYDA	KKLYKSFYIP
201	KNKYDVVSYS	RVDIHYFNDN	FFLCKDNNGN	ILKEPGDCLL	INNYNLKWKE
251	VLIDRINNNW	KKATKQSFSS	NIHSLEQLKY	KHRILFHTEL	NNYHFPFLKK
301	HRAQDIYKYN	WISIEEFKKF	YLQNINHKE	PSMISKETLK	KIFLTLF

**SEQ. ID NO: 18. Nucleotide sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:1.**

ATGACTTTGT	TTTATAAAAT	TATAGCTTTT	TTAAGATTGC	TTAAAATTGA	TAAAAAATTA
AAATTTGATA	ATGAATATTT	TTTAAACTTA	AATAAAAAAA	TCTACAATGA	AAAGCATAAA
GGTTTTTTTG	ATTTTGATCC	AAACTCAAAA	GATACAAAAT	CTCCTTTAAA	TCCATGGGCT
TTTATAAGAG	TAAAAAATGA	AGCCACTACT	TTAAGAGTAT	CACCTGAAAG	TATGTTACCT
GCCATACAAA	GAGGTGTTAT	AGGATATAAT	GATTGTACTG	ATGGAAGTGA	AGAAATTATT
TTGGAATTTT	GCAAACAATA	CCCTTCGTTT	ATACCAGTAA	AATATCCCCA	TGAGGTGCAA
ATTGAAAATC	CGCAAAGCGA	AGAAAATAAA	CTTCATAGTT	ATTATAACTA	TGTAGCTAGT
TTTATACCGC	AAGATGAGTG	GCTTATAAAA	ATAGATGTGG	ATCATTACTA	TGATGCAAAA
AAATTATATA	AGAGTTTTTA	TATGGCATCA	AAAAATACTG	CTGTTAGATT	TCCAAGAATT
AATTTTTTTAA	TACTAGATAA	AATTGTAATT	CAAAATATAG	GAGAATGTGG	TTTTATCGAT
GGAGGGGATC	AATTGTTAAT	TCAAAGTGC	AATAGTGTAT	TTATAGAAAG	AATGGTTTCA
AAGCAAAGTC	AGTGGATTGA	TCCTGAAAAA	ACTGTGAAAG	AATTGTATTTC	TGAACAGCAA
ATTATACCCA	AACATATAAA	AATCTTACAA	GCAGAATTAC	TTCAATGGCA	TTTTCTTGCT
TTAAAATATC	ATAGAAATGA	TTATCAAAAA	CATTTGGATG	CTTTAACTTT	AGAAGATTTT
AAAAAATCC	ATTATAGACA	TAGAAAAATA	AAGAAAATAA	ATTATACAAT	GCTTGATGAA
AAAGTAATTC	GTGAAATATT	AGATAAATTT	AAATTGAGTG	GTAAAAAAT	GACTTTAGCT
ATAATACCTG	CTCGAGCTGG	TTCAAAAGGT	ATAAAAAATA	AAAAATTTAGC	TCTTTTGCAT
GATAGGCCTT	TGTTGTATTA	TACTATCAAT	GCAGCAAAAA	ATTCAAAGTA	TGTAGATAAA
ATTGTTTTTAA	GTAGTGATGG	CGATGATATA	TTAGAATATG	GACAAACTCA	AGGTGTAGAT
GTGTTAAAAA	GACCTAAAGA	ATTAGCGCTA	GATGATACAA	CTAGTGATAA	GGTTGTATTG
CATACCTTGA	GTTTTTATAA	AGATTATGAA	AATATTGTTT	TATTACAACC	CACCTTCTCCT
TTAAGGACAA	ATGTACATAT	AGATGAAGCT	TTTTTAAAAAT	TTAAAAATGA	AAACTCAAAT
GCATTAATAA	GTGTTGTAGA	ATGTGATAAT	AAAATTTTAA	AAGCTTTTAT	AGATGATAAT
GGTAACTTAA	AAGGAATTTG	TGATAACAAA	TATCCATTTA	TGCCTAGACA	AAAATTACCA
AAAACCTATA	TGAGTAATGG	TGCAATTTAT	ATAGTAAAGT	CAAATTTATT	TTTAAATAAC
CCAACCTTTC	TACAAGAAAA	AACAAGTTGC	TATATAATGG	ACGAAAAAGC	TAGTTTGGAT
ATAGATACAA	CAGAGGATTT	AAAAAGAGTT	AATAATATAA	GCTTCTTA	

**SEQ. ID NO: 19. Amino Acid sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:1.**

MTLFYKIIAF	LRLKIDKKL	KFDNEYFLNL	NKKIYNEKHK	GFFDFDPNSK	DTKSPLNPW
AFIRVKNEAT	TLRVSLESLM	PAIQRGVIGY	NDCTDGSEEI	ILEFCKQYPS	FIPVKYPHE
VQIENPQSEE	NKLHSYNYV	ASFIPQDEWL	IKIDVDHYD	AKKLYKSFYM	ASKNTAVRF
PRINFLILDK	IVIQNIGECG	FIDGGDQLLI	QKCNVFIER	MVSKQSQWID	PEKTVKELY
SEQQIIPKHI	KILQAEELLQW	HFPALKYHRN	DYQKHLDALT	LEDFKKIHYR	HRKTIKINY
TMLDEKVIRE	ILDKFKLSGK	KMTLAIIPAR	AGSKGIKNKN	LALLHDRPLL	YRTINAAKN
SKYVDKIVLS	SDGDDILEYG	QTQGVVDLKR	PKELALDDTT	SDKVVLHTLS	FYKDYENIV
LLQPTSPLRT	NVHIDEAFLK	FKNENSNALI	SVVECDNKIL	KAFIDDNGL	KGICDNKYP
FMPRQKLPKT	YMSNGAIYIV	KSNLFLNNPT	FLQEKTSYI	MDEKASLDID	TTEDLKRNNI SFL

**SEQ. ID NO: 20. Nucleotide sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:10.**

ATGCTATTTT	AATCATACTT	TGTGAAAATA	ATTTGCTTAT	TCATCCCTTT	TAGAAAAATT
AGACATAAAA	TAAAAAAAAC	ATTTTTACTA	AAAAACATAC	AACGAGATAA	AATCGATTCT
TATCTACCAA	AAAAAACTCT	TATACAAATT	AATAAATACA	ACAATGAAGA	TTTAATTAAA
CTTAATAAAG	CTATTATAGG	GGGGGGGCAT	AAAGGATATT	TTAATTATGA	TGAAAAATCT
AAAGATCCAA	AATCTCCTTT	GAATCCTTGG	GCTTTTATAC	GAGTAAAAAA	TGAAGCTATT
ACCTTAAAG	CTTCTCTTGA	AAGCATATTG	CCTGCTATT	AAAGAGGTGT	TATAGGATAT
AATGATTGCA	CCGATGGAAG	TGAAGAAATA	ATTCTAGAAT	TTTGCAAACA	ATATCCTTCA
TTTATACCAA	TAAAAATATC	TTATGAAATT	CAAATTCAAA	ACCCAAAATC	AGAAGAAAAAT
AAACTCTATA	GCTATTATAA	TTATGTTGCA	AGTTTTATAC	CAAAAGATGA	GTGGCTCATA
AAAATAGATG	TGGATCATT	TTATGATGCA	AAAAAATTAT	ATAAGAGTTT	TTATATACCT
AGAAAAAATT	ATCATGTAAT	TAGTTACTCT	AGGATAGATT	TTATATTTAA	TGAAGAAAAA
TTTTATGTTT	ATCGGAATAA	GGAGGGGGAG	ATTTTAAAG	CTCCTGGAGA	TTGTTTAGCA
ATACAAAACA	CTAACTTATT	TTGGAAAGAA	ATACTTATTG	AAGATGATAC	ATTTAAGTGG
AATACTGCAA	AAAATAATAT	AGAGAATGCA	AAATCATATG	AAATTTTAAA	AGTTAGAAAT
AGAATTTATT	TTACTACAGA	ACTTAATAAT	TATCATTTTC	CATTTATAAA	AAATTATAGA
AAAAATGATT	ATAAGCAGTT	AAATTGGGTT	AGCTTAGATG	ATTTTATTAA	AAATTATAAA
GAAAAATTAA	AAAATCAAAT	AGATTTTAAA	ATGCTAGAAT	ACAAAACATT	AAAAAAAAGTG
TACAAAAAGC	TTACATCTTC	AGCAAGCGAT	AAAATT		

**SEQ. ID NO: 21. Amino acid sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:1.**

MLFQSYFVKI	ICLFIPFRKI	RHKIKKTFL	KNIQRDKIDS	YLPKKTLIQI	NKYNNEDELI
KLNKAIIGGG	HKGIFYNDEK	SKDPKSPLNP	WAFIRVKNEA	ITLKASLESI	LPATQIRGVI
GYNDCTDGE	EIILEFCKQY	PSFIPIKYPY	BIQIQNPKE	ENKLYSYNY	VASFIPKDE
WLKIDVDHY	YDAKKLYKSF	YIPRKNYHVI	SYSRIDFIFN	EEKFYVVRNK	EGEILKAPG
DCLAIQNTNL	FWKEILIEDD	TFKWNTAKNN	LENKSYEIL	KVRNRIYFTT	ELNNYHFPF
IKNYRKNDYK	QLNWVSLDDF	IKNYKEKLKN	QIDFKMLEYK	TLKKVYKKLT	SSASDKI

**SEQ. ID NO: 22. Nucleotide sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:1. O:36**

DNA :

ATGCTTAAAA	AAATCATTTT	TTTATATAAA	AGATACTCGA	TTTCTAAAAA	ATTGGTTTTA
GATAATGAGC	ATTTTCATTAA	GGAAAAATAAA	AACATCTATG	GAAAAAACA	TAAGGGCTTT
TTTGACTTTG	ATGAAAAGGC	TAAGGATGTG	AAATCACCCC	TTAATCCTTG	GGGATTTATC
AGGGTTAAAA	ATGAAGCTTT	AACCCTAAGA	GTTTCTTTAG	AAAGTATACT	ACCTGCTTTA
CAAAGAGGAA	TTATAGCTTA	CAACGACTGT	GATGATGGGA	GTGAAGAGCT	TATTTTAGAA
TTTTGCAAGC	AATATCCCAA	CTTCATTGCT	AAAAAATATC	CTTATAAAGT	AGATCTAGAA
AATCCTAAAA	ATGAAGAAAA	TAAACTTTAC	TCTTATTACA	ATTGGGCAGC	ATCTTTTATA
CCCTTAGATG	AGTGGTTTAT	AAAAATCGAT	GTGGATCATT	ACTACGATGC	CAAGAAGCTT
TATAAGAGTT	TTTATAGGAT	TGATCAAGAA	AATAAAGCCT	TATGCTACCC	AAGAATTAAT
TTTATAATCT	TAAATGGAAA	TATTTATGTG	CAAAATAGTG	GAAATTATGG	ATTCATAGGG
GGGGGGGATC	AACCTCTGAT	TAAAAGAAGA	AATAGTAGCT	TTATAGAAAAG	AAGGGTTTCA
AAAAAAGCCA	ATGGATAGAT	CCTAAGGGAC	TTATAGAAGA	ACTCTACTCC	GAGCAACAAG
TCTTATCTCA	AGGAGTGAAA	ATACTACAAG	CTCCCCTACT	TCAGTGGCAT	TTTCTGCGCT
TAAATACCG	CCGAAACGAT	TACCAACAAT	ATTTAGATAT	CTTGAGTTTA	GAAGAATTC
AGGCCTTTCA	TCGTAAGAGC	AAAGAGGCTA	AAAAAATAGA	CTTTGCCATG	CTAAAACGCC
CTGTAATCGA	GCAAATATTA	AAGAAATTTT	AAGGAGAGAT	AAAA	

**SEQ. ID NO: 23. Amino acid sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* 0:36.**

MLKKIISLYK	RYSISKKLVL	DNEHFIKENK	NIYGKKHKG	FDFDEKAKDV
KSPLNPWGFI	RVKNEALTLR	VSLESILPAL	QRGIIAYNDC	DDGSEELILE
FCKQYPNFIA	KKYPYKVDLE	NPKNEENKLY	SYYNWAASFI	PLDEWFIKID
VDHYYDAKKL	YKSFYRIDQE	NKALCYPRIN	FIILNGNIYV	QNSGNYGFIG
GGDQLLIKRR	NSSFIERRVS	KKSQWIDPKG	LIEELYSEQQ	VLSQGVKILQ
APLLQWHFPA	LKYRRNDYQQ	YLDILSLEEF	QAFHRKSKEA	KKIDFAMLR
PVIEQILKKF	QGEIK			

**SEQ. ID NO: 24. Nucleotide sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* NCTC11168**

ATGACTTTGT	TTTATAAAAT	TATAGCTTTT	TTAAGATTGC	TTAAAATTGA	TAAAAAATTA
AAATTTGATA	ATGAATATTT	TTTAAACTTA	AATAAAAAAA	TCTACGATGA	AAAGCATAAA
GGTTTTTTTG	ATTTTGATCC	AAACTCAAAA	GATACAAAAT	CTCCTTTAAA	TCCATGGGCT
TTTATAAGAG	TAAAAAATGA	AGCCACTACT	TTAAGAGTAT	CACTTGAAAAG	TATGTTACCT
GCCATACAAA	GAGGTGTTAT	AGGATATAAT	GATTGTACTG	ATGGAAGTGA	AGAAATTATT
TTGGAATTTT	GCAACAATA	CCCTTCGTTT	ATACCAGTAA	AATATCCCCA	TGAGGTGCAA
ATTGAAAATC	CGCAAAGCGA	AGAAAAATAAA	CTTCATAGTT	ATTATAACTA	TGTAGCTAGT
TTTATACCGC	AAGATGAGTG	GCTTATAAAA	ATAGATGTGG	ATCATTACTA	TGATGCAAAA
AAATTATATA	AGAGTTTFTA	TATGGCATCA	AAAAAATACTG	CTGTTAGATT	TCCAAGAATT
AATTTTTTAA	TACTAGATAA	AATTGTAATT	CAAAATATAG	GAGAATGTGG	TTTTATCGAT
GGAGGGGATC	AATTGTTAAT	TCAAAAGTGC	AATAGTGTAT	TTATAGAAAAG	AATGGTTTCA

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AAGCAAAGTC AGTGGATTGA TCCTGAAAAA ACTGTGAAAG AATTGTATTC TGAACAGCAA
ATTATACCCA AACATATAAA AATCTTACAA GCAGAATTAC TTCAATGGCA TTTTCCTGCT
TTAAATATAT ATAGAAATGA TTATCAAAAA CATTGGGATG CTTTAACTTT AGAAGATTTT
AAAAAATCC ATTATAGACA TAGAAAAATA AAGAAAATAA ATTATACAAT GCTTGATGAA
AAAGTAATTC GTGAAATATT AGATAAATTT AAATTGAGTG GTAAAAAAAT GACTTTAGCT
ATAATACCTG CTCGAGCTGG TTCAAAAGGT ATAAAAAATA AAAATTTAGC TCTTTTGCAT
GATAGGCCTT TGTTGTATTA TACTATCAAT GCAGCAAAAA ATTCAAAGTA TGATAGATAAA
ATTGTTTTAA GTAGTGATGG CGATGATATA TTAGAATATG GACAAACTCA AGGTGTAGAT
GTGTTAAAAA GACCTAAAGA ATTAGCGCTA GATGATACAA CTAGTGATAA GGTGTATTG
CATACCTTGA GTTTTTTATA AGATTATGAA AATATTGTTT TATTACAACC CACTTCTCCT
TTAAGGACAA ATGTACATAT AGATGAAGCT TTTTTTAAAT TTAAAAATGA AAACCTCAAAT
GCATTAATAA GTGTTGTAGA ATGTGATAAT AAAATTTTAA AAGCTTTTAT AGATGATAAT
GGTAACTTAA AAGGAATTTG TGATAACAAA TATCCATTTA TGCCTAGACA AAAATACCA
AAAACCTTATA TGAGTAATGG TGCAATTTAT ATAGTAAAGT CAAATTTATT TTAAATAAC
CCAACCTTTC TACAAGAAAA AACAAGTTGC TATATAATGG ACGAAAAAGC TAGTTTGGAT
ATAGATACAA CAGAGGATTT AAAAAGAGTT AATAATATAA GCTTCTTA

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**SEQ. ID NO: 25. Amino Acid sequence of  $\beta$ -1,4-GalNAc transferase from *C. jejuni* NCTC11168**

```

MTLFYKIIAF LRLKIDKKL KFDNEYFLNL NKKIYDEKHK GFFDFDPNSK DTKSPLNPW
AFIRVKNEAT TLRVSLESML PAIQRGVIGY NDCTDGSEEI ILEFCKQYPS FIPVKYPHE
VQIENPQSEE NKLHSYYNYV ASFIPQDEWL IKIDVDHYD AKKLYKSFYM ASKNTAVRF
PRINFLILDK IVIQNIGECG FIDGGDQLLI QKCNSVFIER MVSKQSQWID PEKTVKELY
SEQQIIPKHI KILQAELLQW HFPALKYHRN DYQKHLALT LEDFKKIHYR HRKIKKINY
TMLDEKVIRE ILDKFKLSGK KMTLAIIPAR AGSKGIKNKN LALLHDRPLL YYTINAANK
SKYVDKIVLS SDGDDILEYG QTQGVVDLKR PKELALDDTT SDKVVLHTLS FYKDYENIV
LLQPTSPLRT NVHIDEAFLK FKNENSNALI SVVECDNKIL KAFIDDNGNL KGICDNKYP
FMPRQKLPKT YMSNGAIYIV KSNLFLNNPT FLQEKTSYI MDEKASLDID TTEDLKRVNN ISFL

```

**SEQ ID NO: 26: Nucleotide sequence of  $\beta$ 1,3-galactosyltransferase-encoding ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384**

```

ATGTTTAAAA TTTCAATCAT CTTACCAACT TATAATGTGG AACAATATAT 50
AGCAAGGGCA ATAGAAAGCT GTATCAATCA GACTTTTAAA GATATAGAAA 100
TAATTGTAGT TGATGATTGT GGAAATGATA ATAGTATAAA TATAGCCAAA 150
GAATACTCTA AAAAAGACAA AAGAATAAAA ATAATCCACA ATGAAAAAAA 200
CTTAGGTCTT TTAAGAGCAA GATATGAAGG TGTGAAAGTA GCAAACCTCTC 250
CTTATATAAT GTTTTTAGAT CCTGATGATT ATTTGGAAC TAAATGCTTGT 300
GAAGAGTGTA TAAAAATTTT AGATGAACAG GATGAAGTTG ATTTAGTGTT 350
TTTCAATGCT ATTGTTGAAA GTAATGTTAT TTCATATAAA AAGTTTGACT 400
TTAATTCTGG TTTTATAGC AAAAAAGAGT TTGTAAAAAA AATTATTGCA 450
AAGAAAAATT TATATTGGAC TATGTGGGGG AAACCTTATA GAAAGAAATT 500
GTATTTAGAA GCTTTTGCGA GTTAAAGACT CGAGAAAGAT GTTAAATCA 550
ATATGGCTGA AGATGTATTG TTATATTATC CAATGTTAAG TCAAGCTCAA 600
AAAATAGCAT ATATGAACTG TAATTTATAT CATTACGTGC CTAATAATAA 650
TTCAATTTGT AATACTAAGA ATGAAGTGCT TGTTAAAAAT AATATTCAAG 700
AGTTGCAGTT GGTTTTAAAC TATTTAAGGC AAAATTATAT TTAAACAAG 750
TATTGTAGCG TTCTCTATGT GCTAATTAAA TATTGCTAT ATATTCAAAT 800
ATATAAAATA AAAAGAACAA AATTAATGGT TACATTATTA GCTAAAATAA 850
ATATTTTAAAC TTTAAAAATT TTATTTAAAT ATAAAAAATT TTTAAACAA 900
TGTTAA 906

```

SEQ ID NO: 27 Amino acid sequence of  $\beta$ 1,3-galactosyltransferase encoded by ORF 6a of *LOS* biosynthesis locus from *C. jejuni* strain OH4384

	10	20	30	40	50
1	MFKISIIILPT	YNVEQYIARA	IESCINQTFK	DIEIIVVDDC	GNDNSINIAK
51	EYSKKDKRIK	IIHNEKNLGL	LRARYEGVKV	ANSPYIMFLD	PDDYLELNAC
101	EECIKILDEQ	DEVDLVFFNA	IVESNVISYK	KDFDNSGFYS	KKEFVKKIIA
151	KKNLYWTMWG	KLIRKKLYLE	AFASLRLEKD	VKINMAEDVL	LYYPMLSQAQ
201	KIAYMNCNLY	HYVPNNNSIC	NTKNEVLVKN	NIQELQLVLN	YLRQNYILNK
251	YCSVLYVLIK	YLLYIQIYKI	KRTKLMVTLL	AKINILTTLKI	LFKYKKFLKQ
301	C				

SEQ ID NO: 28. Nucleotide sequence of CgtB  $\beta$ 1,3 galactosyltransferase from *C. jejuni* serotype O:2 (strain NCTC 11168).

ATGAGTCAAA	TTTCCATCAT	ACTACCAACT	TATAATGTGG	AAAAATATAT	50
TGCTAGAGCA	TTAGAAAGTT	GCATTAACCA	AACTTTTAAA	GATATAGAAA	100
TCATTGTAGT	AGATGATTGT	GGTAATGATA	AAAGTATAGA	TATAGCTAAA	150
GAGTATGCTA	GTAAAGATGA	TAGAATAAAA	ATCATACATA	ATGAAGAGAA	200
TTTAAAGCTT	TTAAGAGCAA	GATATGAAGG	TGCTAAAGTA	GCAACTTCAC	250
CTTATATCAT	GTTTTTAGAT	TCTGATGATT	ATTTAGAACT	TAATGCTTGC	300
GAAGAATGTA	TTAAAATTTT	GGATATGGGT	GGGGGGGGTA	AAATTGATTT	350
GTTGTGTTTT	GAAGCTTTTA	TTACCAATGC	AAAAAAATCA	ATAAAAAAAT	400
TAAATATAAA	ACAAGGAAAA	TACAACAACA	AAGAATTTAC	AATGCAAATA	450
CTTAAACTA	AAAATCCATT	TTGGACAATG	TGGGCTAAAA	TAATCAAAAA	500
AGATATTTAT	TTAAAAGCCT	TCAACATGTT	AAATCTCAAA	AAAGAAATCA	550
AAATAAATAT	GGCAGAAGAT	GCCTTATTAT	ATTATCCTTT	GACAATATTA	600
TCTAATGAAA	TATTTTACTT	AACACAACCT	TTGTATACCC	AGCATGTAAA	650
TAGCAATTCT	ATAACAAATA	ATATTAATTC	TTTAGAAGCT	AATATTCAAG	700
AACATAAAAT	TGTTTTAAAT	GTTTTAAAAT	CAATTAAAAA	TAAAAAAACA	750
CCTCTATATT	TTCTAATTAT	ATATTTATTA	AAAATTCAAT	TATTGAAATA	800
TGAACAAAAT	TTTAATAAAA	GAAATATAAA	TCTTATTTAT	TATAAAATAA	850
ATATTTTATA	TCAAAAATAT	CAATTCAAAT	GGAAAAAATT	TTTATATAAT	900
TTAATTCCGT	AA				912

SEQ ID NO: 29. Amino acid sequence of CgtB  $\beta$ 1,3 galactosyltransferase from *C. jejuni* serotype O:2 (strain NCTC 11168).

	10	20	30	40	50
1	MSQISIIILPT	YNVEKYIARA	LESCINQTFK	DIEIIVVDDC	GNDKSIDIAC
51	EYASKDDRIK	IIHNEENLKL	LRARYEGAKV	ATSPYIMFLD	SDDYLELNAC
101	EECIKILDMG	GGGKIDLLCF	EAFITNAKKS	IKKLNIKQ GK	YNNKEFTMQL
151	KTKNPFWTMW	AKIIKKDIYL	KAFNMLNLKK	EIKINMAEDA	LLYYPLTILS
201	NEIFYLTQPL	YTQHVNSNSI	TNNINSLEAN	IQEHKIVLVN	LKSIKNKKTTP
251	LYFLIIYLLK	IQLLKYEQNF	NKRNINLIYY	KINILYQKYQ	FKWKKFLYNL
301	IP				



SEQ ID NO. 30: Nucleotide sequence of  $\beta$ -1,3-galactosyl transferase from *C. jejuni* O:10

```

ATGTTTAAAA TTTCAATCAT CTTGCCAACT TATAATGTGG AACAAATATAT AGCAAGGGCA
ATAGAAAGTT GTATCAATCA GACTTTTAAA AATATAGAAA TAATTGTAGT TGATGATTGT
GGAAGTGACA AAAGTATAGA TATAGTTAAA GAATATGCCA AAAAAGATGA TAGAATAAAA
ATCATACATA ATGAAGAAAA TTTAAACTT TTAAGAGCTA GATATGAAGG TGTAAGTA
GCAAACTCTC CTTATATAAT GTTTTATAGAT CCTGATGATT ATTTAGAACT TAATGCTTGT
GAAGAATGTA TGAAAATTTT AAAAAACAAT GAAATAGATT TATTATTTTT TAATGCATTT
GTATTGGAAT ATAACAATAA AATAGAAAGA AAGTTGAATT TTCAAGAAAA ATGTTATGTA
AAAAAAGATT TTTTAAAGA ACTATTAAAA ACTAAAAATT TATTTTGGAC AGTGTGGGCA
AAAGTCATAA AAAAAGAATT ATATCTCAAG GCTGTTGGTT TAATATCGCT AGAAAATGCT
AAAATAAATA TGGCTGAAGA TGTTTATTA TATTACCCTT TGATAAATAT TTCAAATACT
ATATTTCACT TGAGTAAAAA TTTATACAAT TATCAAATAA ATAATTTCTC TATAACCAA
ACATTAACAT TGCAAAATAT AAAAACAAAT ATACAAGAAC AAGATAATGT TCTATATCTT
CTAAAGAAGA TGCAATATAA TTACAATTTT AACTTAACTT TGCTTAAATT AATTGAGTAT
TTTTTATTAA TTGAAAAATA CTCATTATCA AGCAAGCGAA ATGTTCTTTG TTTTAAATC
AATATTTTTT TTAAAAAAAT CCAATTTAAA TTTTATCGCT TGCTGAAGAT G

```

SEQ ID NO. 31: Amino acid sequence of  $\beta$ -1,3-galactosyl transferase from *C. jejuni* O:10

```

MFKISII LPT YNVEQYIARA IESCINQTFK NIEIIVDDC GSDKSIDIVK EYAKKDDRI
KIIHNEENLK LLRARYEGVK VANSPIYIMFL DPDDYLELNA CEECMKILKN NEIDLFFN
AFVLENNNKI ERKLNFOQEC YVKKDFLKL LKTKNLFWTV WAKVIKKELY LKAVGLISL
ENAKINMAED VLLYYPLINI SNTIFHLSKN LYNQINNFS ITKTLTLQNI KTNIQEQDN
VLYLLKKMQY NYNFNLTLLK LIEYFLLIEK YSLSSKRNVL CFKINIFFKK IQPKFYRLLK M

```

SEQ ID NO: 32. Amino acid sequence of lipid A biosynthesis acyltransferase (*C. jejuni* OH4384).

```

1 MKNSDRIYLS LYYILKFFVT FMPDCILHFL ALIVARIAFH LNKKHRKIIN
51 TNLQICFPQY TQKERDKLSL KIYENFAQFG IDCLQNQNTT KEKILNKVNF
101 INENFLIDAL ALKRPIIFTT AHYGNWEILS LAYAAKYGAI SIVGKKLKSE
151 VMYEILSQSR TQFDIELIDK KGGIRQMLSA LKKERALGIL TDQDCVENES
201 VRLKFFNKEV NYQMGASLIA QRSNALIIPV YAYKEGGKFC IEFFKAKDSQ
251 NASLEELTLY QAQSCEEMIK KRPWEYFFFH RRFASYNEEI YKGAK

```

SEQ ID NO: 33. Amino acid sequence of glycosyltransferase encoded by ORF 3a of *C. jejuni* OH4384 *LOS* locus.

```

1 MNLKQISVII IVKNAEQTLL ECLNSLKDFD EIILLNNESS DNTLKIANEF
51 KKDFANLYIY HNAFIGFGAL KNLALSYAKN DWILSIDADE VLENECIKEL
101 KNLKLQEDNI IALSRKNLYK GEWIKACGWW PDYVLRIFNK NFTRFNDNLV
151 HESLVLPSNA KKIYLNKGLK HYSYKDISHL IDKMQYYSSL WAKQNIHKKS
201 GVLKANLRAF WTTFRNYFLK NGFLYGYKGF IISVCSALGT FFKYMKLYEL
251 QRQKPKTCAL IITYNQKER LKLVLDVSKN LAFLPNEVLI ADDGSKEDTA
301 RLIEEYQKDF PCPLKHIWQE DEGFKLSKSR NKTIKNADSE YIIVIDGDMI
351 LEKDFIKEHL EFAQRKLFLQ GSRVILNKKE SEEILNKDDY RIIFNKKDKF
401 SSKNSFLAKI FYSLSKKR

```

SEQ ID NO: 34. Amino acid sequence of glycosyltransferase encoded by ORF 4a of *C. jejuni* OH4384 *LOS* locus.

```

1  MKKIGVVIPI  YNVEKYLREC  LDSVINQTYT  NLEIILVNDG  STDEHSLNIA
51  KEYTLKDKRI  TLFDKKNGL  SSARNIGIEY  FSGEYKLKNK  TQHIKENSIL
101 EFQLDGNPNY  NIYKAYKSSQ  AFNNEKDLTN  FTYPSIDYII  FLDSDNYWKL
151 NCIEECVIRM  KNVDVLWFDH  DCTYEDNIKN  KHKKTRMEIF  DFKKECIITP
201 KEYANRALSV  GSRDISFGWN  GMIDFNFLKQ  IKLKFINFII  NEDIHFGIIL
251 FASANKIYVL  SQKLYLCRLR  ANSISNHDKK  ITKANVSEYF  KDIYETFGEN
301 AKEAKNYLKA  ASRVITALKL  IEFKDKQKNE  NALAIKETFL  PCYAKKALMI
351 KKFKKDPLNL  KEQLVLIKPF  IQTKLPYDIW  KFWQKIKNI

```

SEQ ID NO: 35. Amino acid sequence of sialic acid synthase encoded by ORF 8a of *C. jejuni* OH4384 *LOS* locus.

```

1  MKEIKIQNII  ISEEKAPLVV  PEIGINHNG  SLELAKIMVD  AAFSTGAKII
51  KHQTHIVEDE  MSKAAKKVIP  GNAKISIEY  MQKCALDYKD  ELALKEYTEK
101 LGLVYLSTPF  SRAGANRLED  MGVSFAKIGS  GECNNYPLIK  HIAAFKKPMI
151 VSTGMNSIES  IKPTVKILLD  NEIPFVLMHT  TNLYPTPHNL  VRLNAMLELK
201 KEFSCMVGLS  DHTTDNLACL  GAVALGACVL  ERHFTDSMHR  SGPDIVCSMD
251 TQALKELIIQ  SEQMAIMRGN  NESKKAQKE  QVTIDFAFAS  VVSIKDIKKG
301 EVLSMDNIWV  KRPGLGGISA  AEFENILGKK  ALRDIENDTQ  LSYEDFA

```

SEQ ID NO: 36. Amino acid sequence of enzyme involved in sialic acid biosynthesis encoded by ORF 9a of *C. jejuni* OH4384 *LOS* locus.

```

1  MYRVQNSSEF  ELYIFATGMH  LSKNFGYTVK  ELYKNGFKNI  YEFINYDKYF
51  STDKALATTI  DGFSRYVNEL  KPDLIVVHGD  RIEPLAAAI  GALNNILVAH
101 IEGGEISGTI  DDSLRHAISK  LAHIHLVNDE  FAKRRLMQLG  EDEKSIFIIG
151 SPDLELLNDN  KISLNEAKKY  YDINYENYAL  LMFHPVTTEI  TSIKNQADNL
201 VKALIQSNKN  YIVIYPNNDL  GFELILQSYE  ELKNNPRFKL  FPSLRFEYFI
251 TLLKNADFII  GNSSCILKEA  LYLKTAGILV  GSRQNGRLGN  ENTLKVNANS
301 DEILKAINTI  HKKQDLFSK  LEILDSSKLF  FEYLSGGEFF  KLNTQKVFKD
351 IK

```

SEQ ID NO: 37. Amino acid sequence of CMP-sialic acid synthetase encoded by ORF 10a of *C. jejuni* OH4384 *LOS* locus.

```

1  MSLAIIPARG  GSKGIKNKNL  VLLNNKPLIY  YTIKAALNTK  SISKVVVSSD
51  SDEILNYAKS  QNVDILKRPI  SLAQDNTTSD  KVLLHALKFY  KDYEDVVFLQ
101 PTSPLRTNIH  IDEAFNLYKN  SNANALISVS  ECDNKILKAF  VCNEYGDLAG
151 ICNDEYPFMP  RQKLPKTYMS  NGAIYILKIK  EFLNNPSFLQ  SKTKHFLMDE
201 SSSLDIDCLE  DLKKAQEIWK  K

```

SEQ ID NO: 38. Amino acid sequence of acetyltransferase encoded by ORF 11a of *C. jejuni* OH4384 *LOS* locus.

```

1  MEKITLKCNC  NILNLLKQYN  IYTKTYIENP  RFRSRLKTKD  FITFPLENNQ
51  LESVAGLGIE  EYCAFKFSNI  LHEMDSFSFS  GSFLPHYTKV  GRYCSISDGV

```

101 SMFNFQHPMD RISTASFTYE TNHSFINDAC QNHINKTFPI VNHNPPSSIT  
 151 HLIIQDDVWI GKDVLLKQGI TLGTGCVIGQ RAVVTKDVPP YAIVAGIPAK  
 201 IIKYRFDEKT IERLLKIQWW KYHFADFYDI DLNLKINQYL DLLEEKIIKK  
 251 SISYYPNPKL YFRDILELKS KKIFNLF

SEQ ID NO: 39. Amino acid sequence of glycosyltransferase encoded by ORF 12a of *C. jejuni* OH4384 *LOS* locus.

1 MPQLSIIIPL FNSCDFISRA LQSCINQTLK DIEILIIDDK SKDNSLNMVL  
 51 EFAKKDPRIK IFQNEENLGT FASRN LGVLH SSSDFIMFLD SDDFLTPDAC  
 101 EIAFKEMKKG FDLLCFDAFV HRVKTQFYR FKQDEVFNQK EFLEFLSKQR  
 151 HFCWSVWAKC FKKDIILKSF EKIKIDERLN YGEDVLFCYI YFMFCEKIAV  
 201 FKTCIYHYEF NPNGRYENKN KEILNQNYHD KKKSNEIIKK LSKEFAHDEF  
 251 HQKLFVLR EEAGVKNRLK